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Final Requirements Document (w/ HITL Results)

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Relative Position Indicator (RPI) - Terminal Automation Requirements Document

Version 1.0
August, 2012

Approved by:

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1. Introduction

1.1. Purpose

The purpose of this document is to capture the functional requirements associated with the integration of the Relative Position Indicator (RPI) into existing and future Terminal Automation Systems to support the necessary programmatic planning as well as the development of the Terminal Automation System platform specific requirements. Throughout this document, references to Automation Systems shall be construed to mean the current Standard Terminal Automation Replacement System (STARS) system and any future Terminal Automation System.

1.2. System Description

RPI is an air traffic control tool to assist in merging and spacing traffic on terminal aRea NAVigation (RNAV) and Required Navigation Performance (RNP) routes, conventional routes, and well-defined flows, hereinafter referred to as “paths”. The goal of RPI is to reduce delay vectoring on aircraft paths by using speed control to achieve proper aircraft spacing. The tool projects an indicator (“ghost”) image of a selected aircraft on the other leg of a route allowing a controller to visualize the relative position of the selected aircraft to others on that leg.

1.3. Scope

This document addresses Terminal Automation System RPI functionality, including the display of information to Air Traffic Controllers. This document does not attempt to capture the full Automation Processing functionality, only the new requirements imposed due to the integration of RPI into the displays of air traffic controllers.

1.4. Assumptions

The following assumptions were used in the development of this document:

1. As there are multiple Automation System platforms with somewhat varying requirements, this document contains functional requirements that are applicable to any Terminal Automation System. Derived and system-specific requirements will be developed separately for each Automation System.
2. The Terminal Automation Systems described in this document have their own set of configuration control documents that will be changed as necessary, using established change procedures, to incorporate the requirements contained herein.

3. Requirements for RPI implementation on Terminal Automation Systems will not adversely impact current system performance.

1.5. Reference Documents

MP 070171 A Functional Description of the Relative Position Indicator (RPI) - 08/07

MP 100253 Relative Position Indicator Prototype System Specification - 08/10

A Concept of Operations for a Relative Position Indicator (RPI) Automation System v1.6 - 06/11

1.6. Applicable Automation System Documents

The following Automation System documents form part of this specification as referenced herein. The latest versions of these documents are applicable at the time of program execution.

STARS System Subsystem Specification, G706201, CDRL E001-13

2. RPI Automation Functions

The Relative Position Indicator tool was developed to assist air traffic controllers in merging and spacing aircraft on defined paths in the terminal area. The RPI tool uses surveillance data processed by Terminal Automation Systems to display aircraft indicators in the Terminal Radar Approach Control (TRACON) airspace. The RPI tool facilitates sequencing aircraft on merging paths by assisting controllers in the use of speed control in lieu of delay vectoring. The graphic representation of paths and images of aircraft positions superimposed on other paths increases situational awareness for air traffic controllers.

Each RPI Application is a single operating instance consisting of a single reference path, one or more Image Paths, one or more qualification regions, and a set of filters. The behavior of an RPI Application is specified by its RPI Adaptation as well as by specific commands input by the controller.

2.1. Path Modeling

The RPI tool models paths based on route-specific adaptation data that includes an ordered sequence of waypoints, fixes, NAVAIDS, etc., hereinafter referred to as “points,” defining the reference path. Altitude and speed values are defined for each of these points. The Automation System must compute the path between these points in order to determine the appropriate acceptable position boundaries and point sequence for the entire procedure. All candidate RPI tracks must fall within an adapted qualification region to be considered for projected

display. Various filters are available to control which aircraft qualify for projection.

2.1.1. Path Definition

Reference and Image Paths are defined by an ordered sequence of points, using fly-by Track-to-Fix (TF) or Radius-to-Fix (RF) legs beginning with an Initial Fix (IF) and ending at a Reference Point and Image Point respectively. If these points are collocated it is considered to be a Merge Point. Because TF legs can be sequential, an altitude and velocity are associated with TF points to determine the characteristics of the nominal fly-by turn between the TF legs. Fly-over TF legs are not used for turns in RPI.

A Track-to-Fix Leg defines a track over ground between two known database fixes (defined by a latitude and longitude). It is the preferred method for specifying straight leg segments in a path procedure. A Radius-to-Fix Leg or Constant Radius Arc defines a constant radius turn between two database fixes, lines tangent to the arc and a center fix.

The Image Path is the means to display aircraft on the other leg of a merging route. An Aircraft Indictor is a symbol displayed on an Image Path that corresponds to an actual aircraft (Input Aircraft) on the Reference Path. The placement of the Aircraft Indicator along the Image Path is based on the distance of the Input Aircraft from the Reference Point along the Reference Path.

Figure 1 shows an example of an RPI Reference Path and one Image Path showing the Qualification Region and showing Input Aircraft on the Reference Path with corresponding Aircraft Indicators (in yellow) on the Image Path.

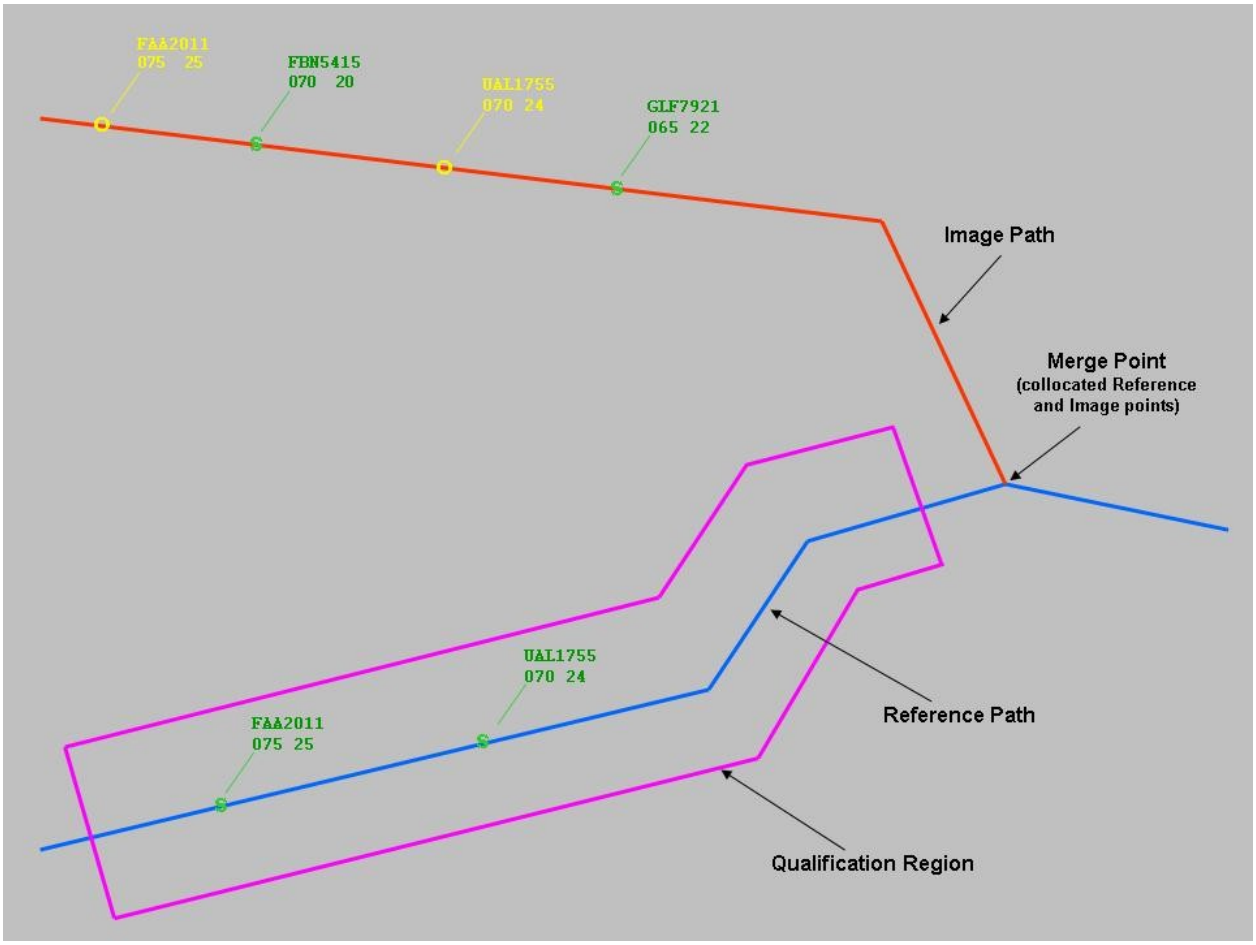


Figure 1. Example RPI Reference and Image Paths

2.2. RPI Projection Processing

For the RPI tool to correctly project the position of an aircraft in the qualification region onto another path, the distance of the aircraft along its path to the merge point must be calculated. In order to accomplish this, the aircraft's position is determined in relation to a nominal flight path along the defined path. This nominal flight path is determined by partitioning the defined route into straight line segments and turn segments.

The position of a qualifying aircraft along a path is defined as the shortest perpendicular distance between the aircraft and the nominal path. The distance along the segments are summed from the merge point back to the aircraft's point on the path. This distance along the path, the perpendicular distance, and direction from the path are used to determine the projected Aircraft Indicator position on the Image Path.

2.3. Aircraft Indicator Location Processing

Projection Distance is defined as the distance of an aircraft along the Nominal Flight Path to the Merge Point.

The Lateral Offset Distance is the distance from an aircraft to the Nominal Flight Path.

The Projection Distance is determined by calculating the length of the segments along the path and adding them together.

2.3.1. Straight Segments

A Straight Segment is defined as a segment of the Nominal Flight Path that does not contain a turn. This includes the straight legs between turn segments, as well as straight segments at the beginning and end of the path (if applicable).

The Qualifying Point of a Straight Segment is the point on the Nominal Flight Path that is closest to the aircraft.

The Lateral Offset distance is determined by finding a line perpendicular to the segment from the Qualifying Point to the intersection with the aircraft's location.

2.3.2. Turn Segments

A Turn Segment is defined as a segment of the Nominal Flight Path that contains a turn. This includes RF Legs by definition and turns derived for each TF Point that is followed by another TF Point.

The Qualifying Point of a Turn Segment is defined as the point at the intersection of the Turn Segment and a line from the Turn Center Point through the Input Aircraft's location.

The Lateral Offset Distance is defined as the distance from the Qualifying Point of a Turn Segment to the Input Aircraft's location along that segment.

2.4. Position Projection Processing

The location of a qualifying aircraft is compared to all segments of the Nominal Flight Path. The segment that has the shortest Lateral Offset Distance to the aircraft is defined as the Qualifying Segment. The Qualifying Point associated with the Qualifying Segment is the starting point for the Projection Distance computation.

The Projection Distance of an input aircraft along the Nominal Flight Path is computed as the sum of the lengths of all segments preceding the Qualifying Segment added to the distance along the Qualifying Segment from the beginning of the Qualifying Segment to the Qualifying Point.

Static Offset and Wake Offset are added to the Projection Distance to obtain the Offset Projection Distance, which, in conjunction with the Lateral Offset Distance and direction, is used to calculate the locations of indicators.

The Nominal Indicator Point of an Image Path is defined as the point at which the Lateral Offset distance is applied.

The position of the Indicator Point relative to the Nominal Flight Path Point is found by taking the Offset Projection Distance and offsetting the Indicator Point by the Lateral Offset Distance in a direction perpendicular to that of the Image Path. If the qualifying aircraft is to the right of the Reference Path then the Indicator Point is to the right of the Image Path. If the qualifying aircraft is to the left of the Reference Path then the Indicator Point is to the left of the Image Path. If Mirror Imaging is enabled for that Image Path and the Indicator Point is to the left of the Reference Path then the qualifying aircraft is to the right of the Image Path. If Mirror Imaging is enabled for that Image Path and the Indicator Point is to the right of the Reference Path then the qualifying aircraft is to the left of the Image Path. Mirror Imaging is used when the geometry of a Reference Path/Image Path pair is such that applying the Lateral Offset on the same side would result in an erroneous Indicator Point location along the Image Path.

2.5. Qualification Region Design

A Qualification Region is a closed polygon of an adaptable size and shape drawn around a Reference Path. Aircraft within a Qualification Region that comply with adaptable filters are eligible for RPI processing.

Qualification Region Filters are a means of determining which aircraft on the Reference Path can have an Aircraft Indicator shown on an Image Path. All Qualification Region Filters are defined in the adaptation for each RPI Application.

There are limitations on the boundaries of the Qualification Region that should be considered when designing the polygon. These limitations are on the end boundaries of the region and the width of the region as related to turn segments on both the Reference Path and the Image path. The Qualification Region will be constructed such that the start point (initial fix) and end point (reference point) of the reference line is on the boundary of or outside the qualification region. On a turn segment of the Reference Path the perpendicular distance on the inside of the turn to the Qualification Region from the turn segment will be less than the radius of the turn. Error: Reference source not found illustrates the Qualification Region limit for Reference Paths.

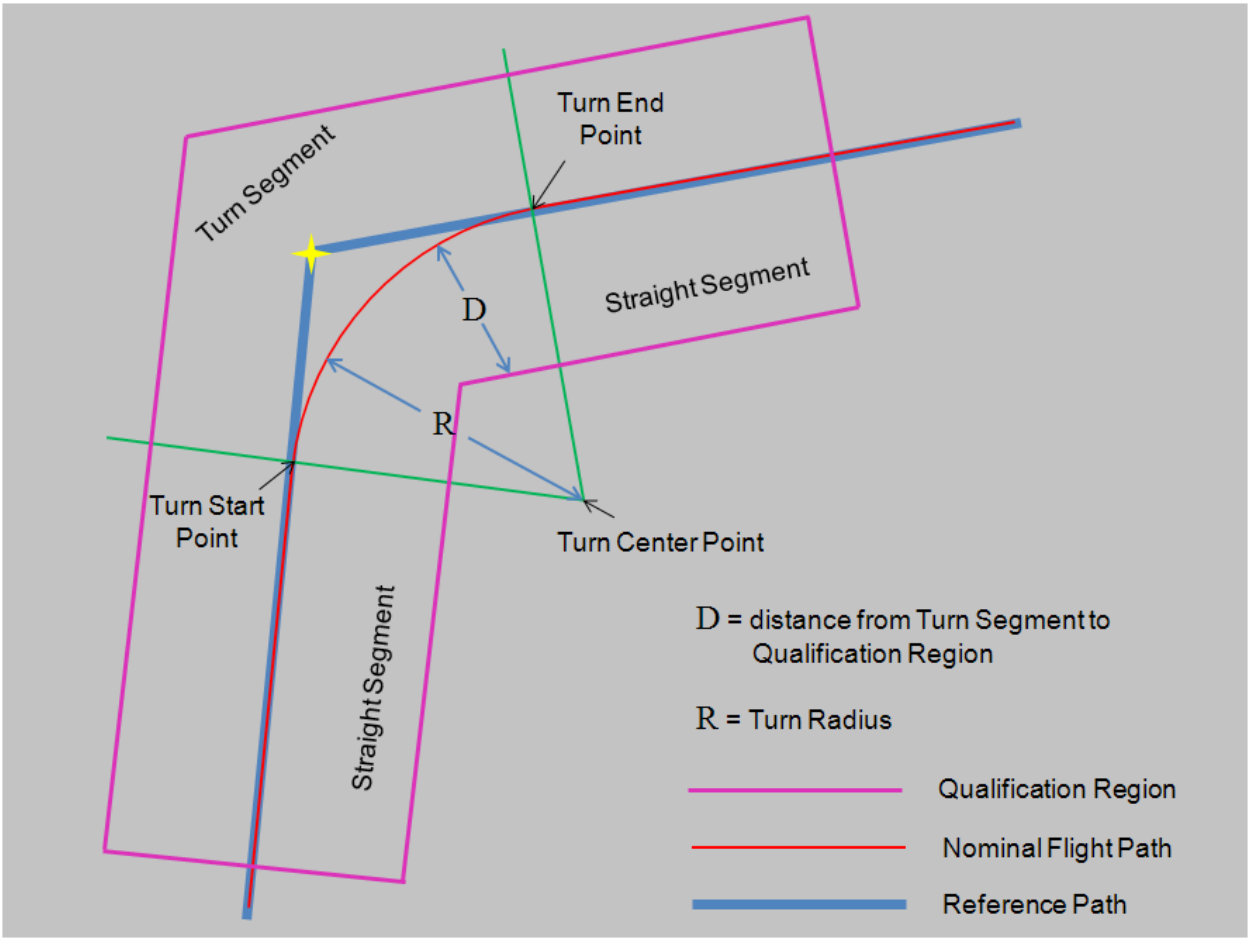


Figure 2. Reference Path Qualification Region Limit

On a turn segment of the Image Path the perpendicular distance on the inside of the turn to the Qualification Region from the portion of the Reference Path that projects onto the turn segment of the Image Path will be less than the radius of the turn. Error: Reference source not found illustrates the Qualification Region limit for Image Paths.

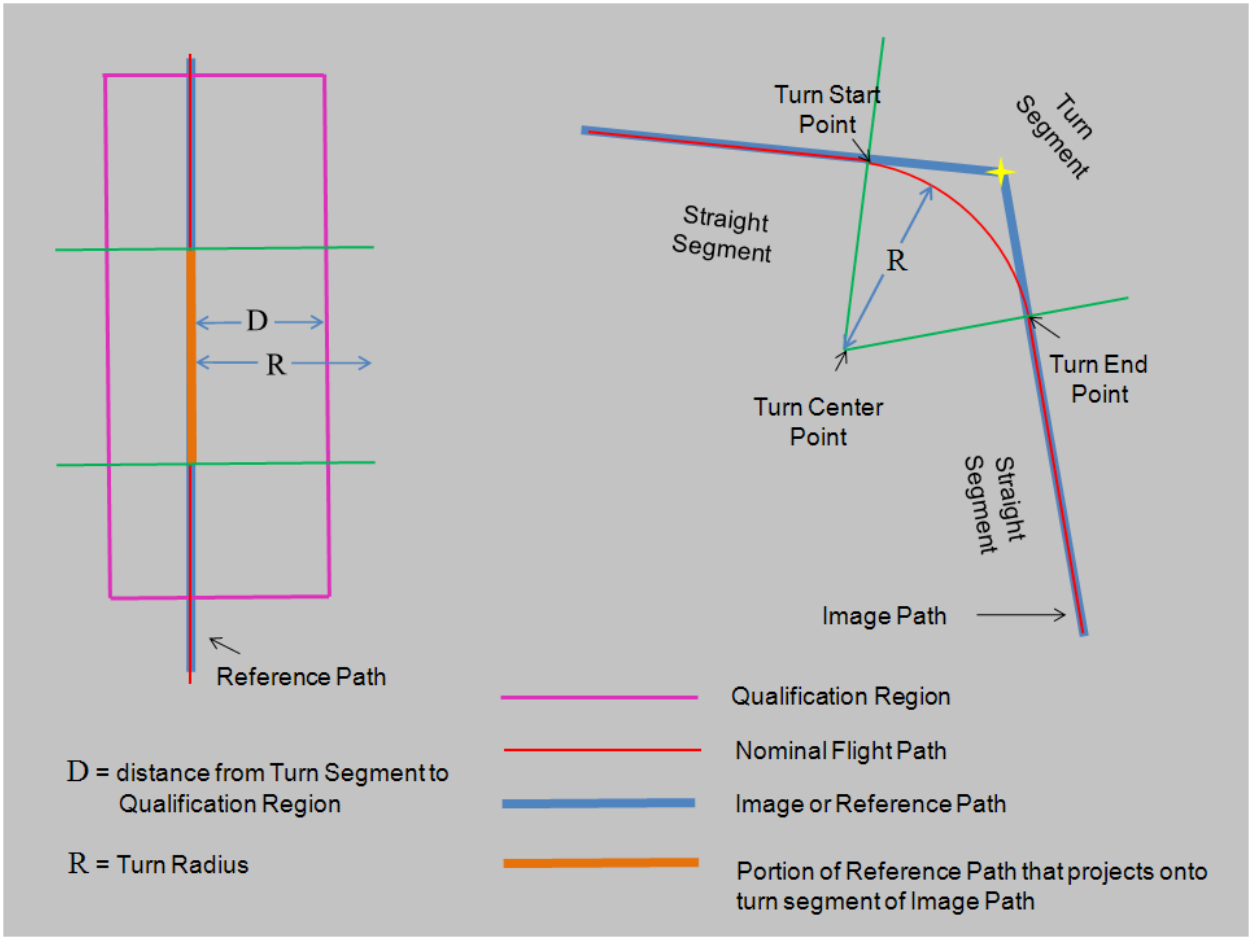


Figure 3. Image Path Qualification Region Limit

3. Functional Requirements

3.1. General

(RD.3.1.a.) An RPI Application **shall** project an image of a qualifying input aircraft from the Reference Path onto one or more Image Paths.

(RD.3.1.b) Each RPI Application **shall** be defined in adaptation.

(RD.3.1.c) The Automation System **shall** be capable of adapting no less than 128 RPI Applications.

(RD.3.1.d) The Automation System **shall** be capable of adapting no less than 128 RPI Application Sets.

(RD.3.1.e) The system **shall** display no more than 32 RPI Applications, Application Sets or combinations thereof in the selection menu per display.

(RD.3.1.f) If RPI is enabled, the Automation System **shall** be capable of processing no less than 128 simultaneous RPI Applications.

(RD.3.1.g) The Automation System **shall** be capable of supporting no less than 16 active Applications per display.

(RD.3.1.h) The Automation System **shall** be capable of supporting no less than 20 targets per Image Path.

(RD.3.1.i) The Automation System **shall** be capable of supporting no less than 100 Aircraft Indicator per display.

(RD.3.1.j) The Automation System **shall** update the Aircraft Indicator displayed position with a latency of no more than 200 milliseconds of updating the displayed position of the input aircraft.

(RD.3.1.k) The Automation System **shall** display the position of the Aircraft Indicator along the image path with the same accuracy as the display of the Input Aircraft along the Reference Path, excluding error due to latency defined in RD.3.1.j.

(RD.3.1.l) The Automation System **shall** display the position of the Aircraft Indicator relative to its calculated position consistent with existing Automation System requirements.

(RD.3.1.m) The Automation System **shall** be capable of accepting the RPI adaptation in XML format.

(RD.3.1.n) Application Sets **shall** consist of two or more Applications.

(RD.3.1.o) The Automation System shall process an Application as stand-alone or part of one or more Application Sets.

(RD.3.1.p) RPI Applications and Application Sets **shall** be enabled and disabled by keyboard entry and graphical interface facility-wide.

(RD.3.1.q) The Automation System **shall** have the capability to enable and disable the RPI function facility-wide.

(RD.3.1.r) Enabling RPI function facility-wide **shall** return facility-wide RPI function settings to adapted defaults.

(RD.3.1.s) The Automation System **shall** have the capability to enable and disable individual Applications and Application Sets facility-wide in adaptation.

(RD.3.1.t) The Automation System **shall** provide facility-wide RPI status in the system status data area.

(RD.3.1.u) The Automation System **shall** provide the capability to display the status of individual RPI Applications and Application Sets.

(RD.3.1.v) Disabling an Application Set **shall** disable all Applications that are contained in that Application Set.

(RD.3.1.w) An Application’s enabled state shall be identical in each Application Set it is part of.

(RD.3.1.x) After disabling an Application Set, the Automation System **shall** allow an individual Application in that set to be enabled independently.

(RD.3.1.y) Enabling an Application Set **shall** enable all Applications that are contained in that Application Set.

(RD.3.1.z) If all Applications of an Application Set are disabled, the Application Set **shall** be considered disabled.

(RD.3.1.aa) RPI commands entered at one display **shall** only affect that display, unless otherwise defined herein.

3.1.1. Reference Path Definition

(RD.3.1.1.a) Each RPI Application **shall** contain exactly one Reference Path.

(RD.3.1.1.b) Each Reference Path **shall** be comprised of a sequence of between 2 to 16, inclusive, WGS84 geodetic points beginning with an IF and terminating at the Reference Point.

(RD.3.1.1.c) Each point in a Reference Path following the IF **shall** be a segment termination fix of either a TF or RF type.

(RD.3.1.1.d) Each TF Point in the Reference Path definition **shall** include both expected altitude and airspeed values.

(RD.3.1.1.e) Each RF Point in the Reference Path definition **shall** include Turn Center Point, Arc Radius, turn completion waypoint (the RF point), turn direction, expected altitude and expected airspeed values.

(RD.3.1.1.f) The Automation System **shall** provide the capability to toggle the display of RPI Reference Paths on and off on a per Application or Application Set basis.

3.1.2. Image Path Definition

(RD.3.1.2.a) Each RPI Application **shall** have no less than one corresponding Image Path.

(RD.3.1.2.b) Each Image Path **shall** be comprised of a sequence of between 2 to 16, inclusive, WGS84 geodetic points beginning with an IF and terminating at the Image Point.

(RD.3.1.2.c) Each point in an Image Path following the IF **shall** be a segment termination fix of either a TF or RF type.

(RD.3.1.2.d) Each TF Point in the Image Path definition **shall** include both expected altitude and airspeed values.

(RD.3.1.2.e) Each RF Point in the Image Path definition **shall** include Turn Center Point, Arc Radius, turn completion waypoint (the RF point), turn direction, expected altitude and expected airspeed values.

(RD.3.1.2.f) Each Image Path definition **shall** include a Mirror Imaging parameter of enabled or disabled in adaptation.

(RD.3.1.2.g) The Automation System **shall** depict only one Aircraft Indicator per Image Path for each qualifying Input Aircraft on the Reference Path.

(RD.3.1.2.h) No more than 5 Image Paths **shall** be contained in each RPI Application.

(RD.3.1.2.i) The Automation System **shall** provide the capability to toggle the display of all RPI Reference Paths and Image Paths on and off.

(RD.3.1.2.j) The Automation System shall provide the capability to toggle the display of RPI Image Paths on and off on a per Application or Application Set basis.

3.1.3. Qualification Region Definition

(RD.3.1.3.a) The Automation System **shall** show an Aircraft Indicator for a qualifying Input Aircraft on a Reference Path only if that Input Aircraft is contained within the Qualification Region boundaries.

(RD.3.1.3.b) The Automation System **shall** be capable of supporting no more than 10 qualification regions for each RPI Application.

(RD.3.1.3.c) Each Reference Path **shall** have no less than one associated Qualification Regions.

(RD.3.1.3.d) Each Qualification Region **shall** consist of a sequence of WGS84 geodetic points that define a simple non-self-intersecting polygon.

(RD.3.1.3.e) A Qualification Region polygon **shall** have no less than three sides.

(RD.3.1.3.f) The Automation System **shall** support a Qualification Region polygon of between 3 to 15 inclusive, sides.

(RD.3.1.3.g) An Input Aircraft **shall** be eligible for RPI processing if the following two conditions are met: (1) Input Aircraft is located within the Qualification Region polygon and (2) the Input Aircraft passes all applicable filters, unless filters are overridden for that aircraft.

(RD.3.1.3.h) The Automation System **shall** provide the capability to toggle on and off the display of all RPI Qualification regions adapted for the display.

(RD.3.1.3.i) The Automation System **shall** provide the capability to toggle the display of RPI Qualification regions on and off on a per Application basis adapted for the display.

(RD.3.1.3.j) The Automation System **shall** provide the capability to toggle the display of RPI Qualification regions on and off on a per Application Set basis adapted for the display.

3.1.3.1. Qualification Region Filters

(RD.3.1.3.1.a) Each filter **shall** be capable of being enabled and disabled on a per Qualification Region basis.

(RD.3.1.3.1.b) The Automation System **shall** allow an enable or disable override of all filters for a specific Input Aircraft.

3.1.3.1.1. Magnetic Heading Filter

(RD.3.1.3.1.1.a) Each Qualification Region **shall** include an adaptable Magnetic Heading Filter in the form of a beginning and ending range.

(RD.3.1.3.1.1.b) The magnetic heading filter range **shall** be specified in degrees referenced to magnetic North.

(RD.3.1.3.1.1.c) An Input Aircraft **shall** be considered to have qualified for the magnetic heading filter if the Input Aircraft heading is within the specified heading range.

3.1.3.1.2. Altitude Filter

(RD.3.1.3.1.2.a) Each Qualification Region **shall** include an adaptable altitude filter.

(RD.3.1.3.1.2.b) The altitude filter **shall** have a floor and ceiling altitude specified as a range in feet above mean sea level (MSL).

(RD.3.1.3.1.2.c) An Input Aircraft **shall** be considered to have qualified for the altitude filter if the Input Aircraft's Mode-C altitude is greater than or equal to the filter's floor altitude and less than or equal to the filter's ceiling altitude.

(RD.3.1.3.1.2.d) In the absence of Mode-C altitude data, adaptation **shall** specify whether an input aircraft is considered to have qualified for the altitude filter.

3.1.3.1.3. Scratchpad Filters

(RD.3.1.3.1.3.a) Each Qualification Region **shall** include a Scratchpad Inclusion Filter.

(RD.3.1.3.1.3.b) The Scratchpad Inclusion Filter **shall** contain no more than 20 values.

(RD.3.1.3.1.3.c) An Input Aircraft **shall** be considered to have qualified for the Scratchpad Inclusion Filter if the Input Aircraft's scratchpad is equal to any of the values specified in the Scratchpad Inclusion Filter.

(RD.3.1.3.1.3.d) The Scratchpad Inclusion Filter **shall** allow the ability to specify that the absence of all scratchpad values be used to qualify an Input Aircraft.

(RD.3.1.3.1.3.e) Each Qualification Region **shall** include a Scratchpad Exclusion Filter.

(RD.3.1.3.1.3.f) The Scratchpad Exclusion Filter **shall** contain no more than 20 values.

(RD.3.1.3.1.3.g) An Input Aircraft **shall** be considered to have qualified for the Scratchpad Exclusion Filter if the Input Aircraft's scratchpad is equal to any of the scratchpad values specified in the Scratchpad Exclusion Filter.

(RD.3.1.3.1.3.h) The Scratchpad Exclusion filter **shall** allow the ability to specify that the absence of all scratchpad values be used to disqualify an Input Aircraft.

(RD.3.1.3.1.3.i) A Qualification Region **shall** allow a Scratchpad Inclusion Filter to be enabled only if a Scratchpad Exclusion Filter is not enabled for that region.

(RD.3.1.3.1.3.j) A Qualification Region **shall** allow a Scratchpad Exclusion Filter to be enabled only if a Scratchpad Inclusion Filter is not enabled for that region.

3.1.3.1.4. Datablock Offset Filter

(RD.3.1.3.1.4.a) Each Qualification Region **shall** include a Datablock Offset Filter.

(RD.3.1.3.1.4.b) The datablock offset values **shall** be specified as North, Northeast, East, Southeast, South, Southwest, West, and Northwest.

(RD.3.1.3.1.4.c) An Input Aircraft **shall** be considered to have qualified for the datablock offset filter if the Input Aircraft's datablock offset direction is equal to one of the adapted filter datablock directions.

3.1.3.1.5. Entry Fix Filters

(RD.3.1.3.1.5.a) Each Qualification Region **shall** include an Entry Fix Inclusion Filter.

(RD.3.1.3.1.5.b) The Entry Fix Inclusion Filter **shall** contain no more than 20 entry fixes.

(RD.3.1.3.1.5.c) An Input Aircraft **shall** be considered to have qualified for the Entry Fix Inclusion Filter if the Input Aircraft's entry fix is equal to any of the entry fixes specified in the Entry Fix Inclusion Filter.

(RD.3.1.3.1.5.d) The Entry Fix Inclusion filter shall allow the ability to specify that the absence of entry fix be used to qualify an Input Aircraft.

(RD.3.1.3.1.5.e) Each Qualification Region **shall** include an Entry Fix Exclusion Filter.

(RD.3.1.3.1.5.f) The Entry Fix Exclusion Filter **shall** contain no more than 20 entry fixes.

(RD.3.1.3.1.5.g) An Input Aircraft **shall** be considered to have qualified for the Entry Fix Exclusion Filter if the Input Aircraft's entry fix is not equal to any of the entry fixes specified in the Entry Fix Exclusion Filter.

(RD.3.1.3.1.5.h) The Entry Fix Exclusion filter shall allow the ability to specify that the absence of entry fix be used to disqualify an Input Aircraft.

(RD.3.1.3.1.5.i) An RPI Reference Path **shall** allow an Entry Fix Inclusion Filter to be enabled only if an Entry Fix Exclusion Filter is not enabled for that path.

(RD.3.1.3.1.5.j) An RPI Reference Path **shall** allow an Entry Fix Exclusion Filter to be enabled only if an Entry Fix Inclusion Filter is not enabled for that path.

3.1.3.1.6. Exit Fix Filters

(RD.3.1.3.1.6.a) Each Qualification Region **shall** include an Exit Fix Inclusion Filter.

(RD.3.1.3.1.6.b) The Exit Fix Exclusion Filter **shall** contain no more than 20 exit fixes.

(RD.3.1.3.1.6.c) An Input Aircraft **shall** be considered to have qualified for the Exit Fix Inclusion Filter if the Input Aircraft's exit fix is equal to any of the exit fixes specified in the Exit Fix Inclusion Filter.

(RD.3.1.3.1.6.d) The Exit Fix Inclusion filter **shall** allow the ability to specify that the absence of exit fix be used to qualify an Input Aircraft.

(RD.3.1.3.1.6.e) Each Qualification Region **shall** include an Exit Fix Exclusion Filter.

(RD.3.1.3.1.6.f) The Exit Fix Exclusion Filter **shall** contain no more than 20 exit fixes.

(RD.3.1.3.1.6.g) An Input Aircraft **shall** be considered to have qualified for the Exit Fix Exclusion Filter if the Input Aircraft's exit fix is not equal to any of the exit fixes specified in the Exit Fix Exclusion Filter.

(RD.3.1.3.1.6.h) The Exit Fix Exclusion filter **shall** allow the ability to specify that the absence of exit fix be used to disqualify an Input Aircraft.

(RD.3.1.3.1.6.i) An RPI Reference Path **shall** allow an Exit Fix Inclusion Filter to be enabled only if an Exit Fix Exclusion Filter is not enabled for that path.

(RD.3.1.3.1.6.j) An RPI Reference Path **shall** allow an Exit Fix Exclusion Filter to be enabled only if an Exit Fix Inclusion Filter is not enabled for that path.

3.1.3.1.7. Controller Symbol Filter

(RD.3.1.3.1.7.a) Each Qualification Region **shall** include a Controller Symbol Inclusion Filter.

(RD.3.1.3.1.7.b) The Controller Symbol Inclusion Filter **shall** contain no more than 20 controller symbols.

(RD.3.1.3.1.7.c) An Input Aircraft **shall** be considered to have qualified for the Controller Symbol Inclusion Filter if the Input Aircraft's controller symbol is equal to any of the controller symbols specified in the Controller Symbol Inclusion Filter.

(RD.3.1.3.1.7.d) Each Qualification Region **shall** include a Controller Symbol Exclusion Filter.

(RD.3.1.3.1.7.e) The Controller Symbol Exclusion Filter **shall** contain no more than 20 controller symbols.

(RD.3.1.3.1.7.f) An Input Aircraft **shall** be considered to have qualified for the Controller Symbol Exclusion Filter if the Input Aircraft's controller symbol is not equal to any of the controller symbols specified in the Controller Symbol Exclusion Filter.

(RD.3.1.3.1.7.g) A Qualification Region **shall** allow a Controller Symbol Inclusion Filter to be enabled only if a Controller Symbol Exclusion Filter is not enabled for that region.

(RD.3.1.3.1.7.h) A Qualification Region **shall** allow a Controller Symbol Exclusion Filter to be enabled only if a Controller Symbol Inclusion Filter is not enabled for that region.

3.2. Aircraft Indicator Display Configuration

3.2.1. Datablock Configuration

(RD.3.2.1.a) Each RPI Application **shall** include an option to display either Aircraft Indicator full datablocks or Aircraft Indicator partial datablocks.

(RD.3.2.1.b) The Aircraft Indicator default datablock display state **shall** be defined in Adaptation.

(RD.3.2.1.c) Individual fields and field timesharing in the Aircraft Indicator full and partial datablocks **shall** be Automation System adaptable.

(RD.3.2.1.d) The Aircraft Indicator datablock **shall** include the input aircraft target state, including TRK, ISR, CST, and RDR.

(RD.3.2.1.e) The Aircraft Indicator datablock **shall** include the input aircraft target IDENT state.

(RD.3.2.1.f) Each individual RPI Application **shall** include the option to specify the color of the Aircraft Indicators and datablocks via adaptation.

(RD.3.2.1.g) Each RPI Application **shall** include the option to specify via adaptation the controller symbol for Aircraft Indicators as no symbol or as any character or symbol available in the display font.

3.2.2. Indicator Extensions

(RD.3.2.2.a) Each RPI Application **shall** include the option to display a leading indicator extension line in nautical miles for Aircraft Indicator as defined in adaptation.

(RD.3.2.2.b) If a leading extension line has been specified, the Automation System **shall** display a leading extension line projected parallel to the Nominal Path of each Aircraft Indicator.

(RD.3.2.2.c) Each RPI Application **shall** include the option to display a trailing indicator extension line in nautical miles for Aircraft Indicator as defined in adaptation.

(RD.3.2.2.d) If a trailing extension line has been specified in an RPI Application's adaptation, the Automation System **shall** display a trailing extension line projected parallel to the Nominal Path of each Aircraft Indicator.

(RD.3.2.2.e) The default color and intensity of leading and trailing Indicator Extensions **shall** be the same as the Aircraft Indicator datablock.

Figure 4 shows an example of Indicator Extensions

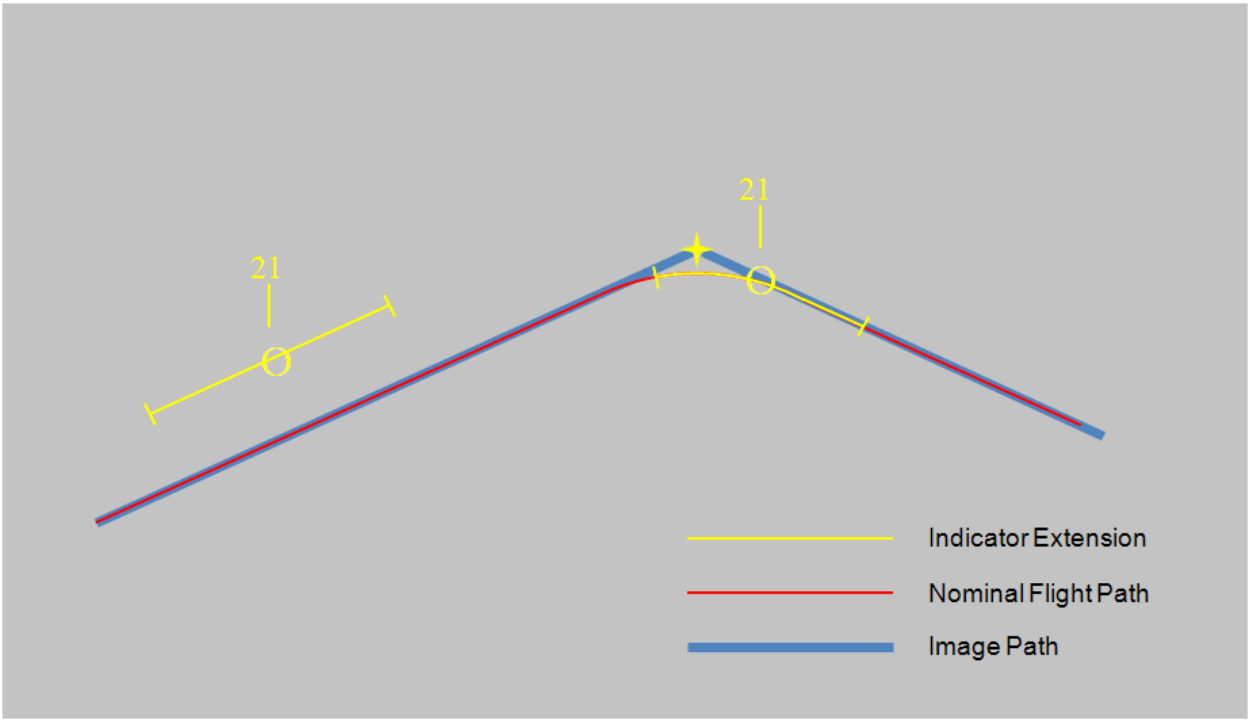


Figure 4. Example of Indicator Extensions

3.2.3. History Trails

(RD.3.2.3.a) The Automation System **shall** include the option to specify via adaptation whether or not to display history trails for Aircraft Indicators in accordance with existing Automation System requirements.

3.3. Nominal Flight Path Processing

3.3.1. Path Segments

(RD.3.3.1.a) The Automation System **shall** compute a Nominal Flight Path for each Reference Path and each Image Path.

(RD.3.3.1.b) The Automation System **shall** use a sequence consisting of Straight Segments, Turn Segments, or both to compose each Nominal Flight Path.

(RD.3.3.1.c) The Automation System **shall** end the final segment at the Image Point or Reference Point.

Figure 5 shows an example Path with straight and turn segments delineated.

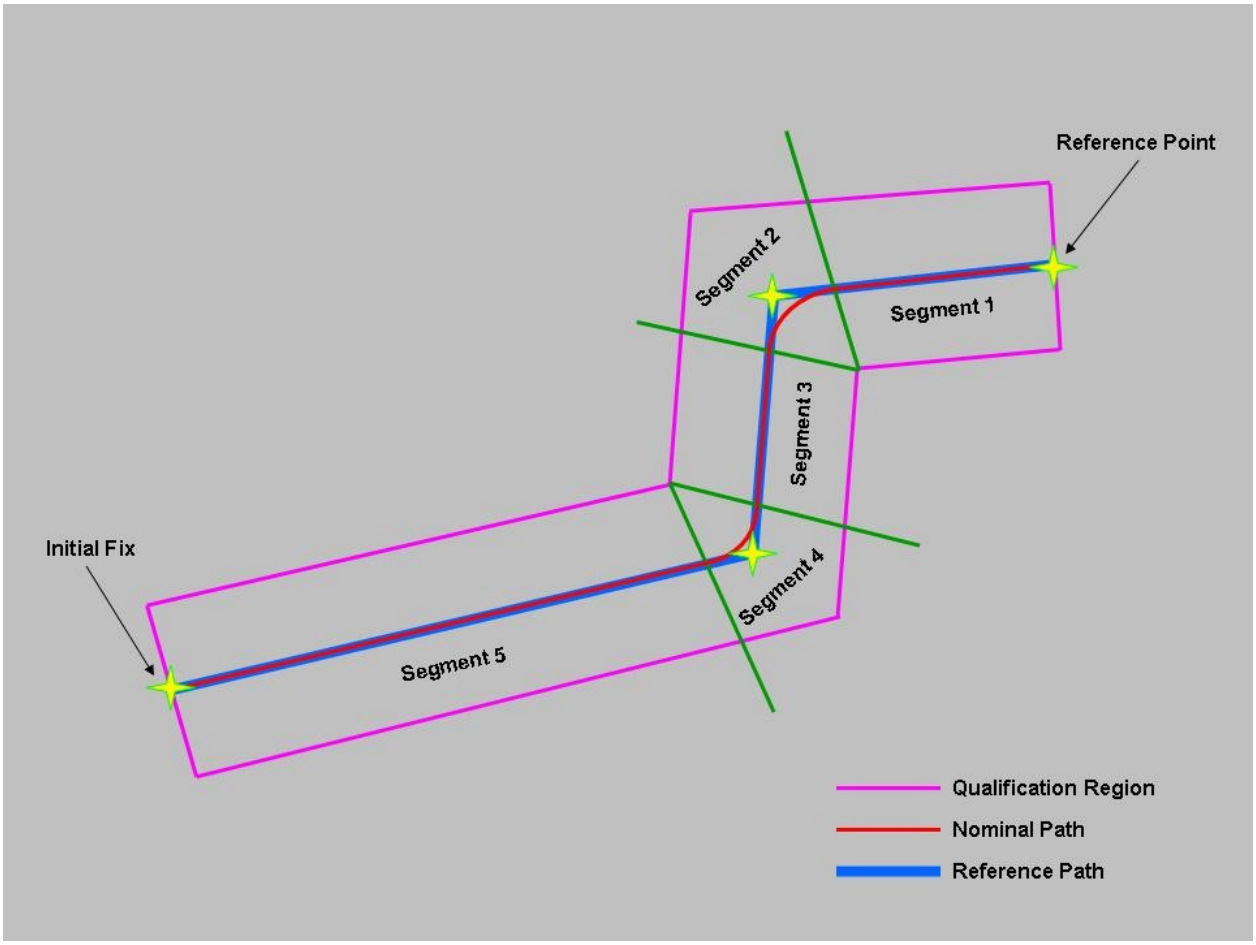


Figure 5. Example Path Showing Segments

3.3.1.1. Straight Segments

(RD.3.3.1.1.a) The Automation System **shall** use one Straight Segment in the Nominal Flight Path for each TF Point in the path.

(RD.3.3.1.1.b) The Automation System **shall** begin the Straight Segment for a TF Point that follows an IF at the IF.

(RD.3.3.1.1.c) The Automation System **shall** begin the Straight Segment for a TF Point that follows an RF Point at the turn completion point of the RF leg.

(RD.3.3.1.1.d) The Automation System **shall** begin the Straight Segment for a TF Point that follows a TF Point at the end of the Turn Segment that precedes the Straight Segment.

(RD.3.3.1.1.e) The Automation System **shall** end the Straight Segment for a TF Point that precedes an RF Point at turn initiation point of the RF leg.

(RD.3.3.1.1.f) The Automation System **shall** end the Straight Segment for a TF Point that precedes a TF Point at the beginning of the Turn Segment that follows that Straight Segment.

Figure 6 shows an example Path with an RF segment.

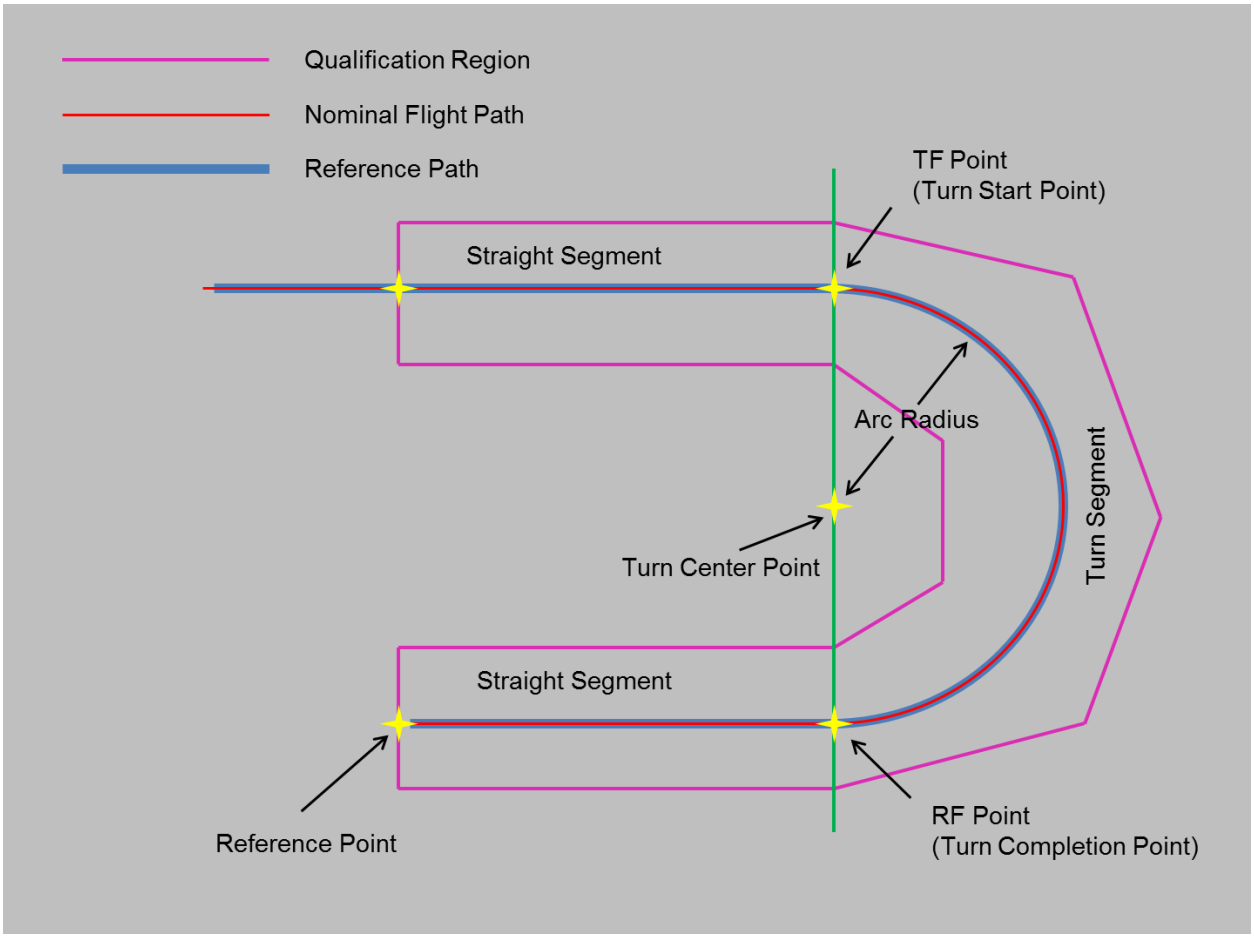


Figure 6. RF Turn

3.3.1.2. Turn Segments

3.3.1.2.1. RF Point Turns

(RD.3.3.1.2.1.a) The Automation System **shall** use one Turn Segment in the Nominal Flight Path for each RF Point in the path.

(RD.3.3.1.2.1.b) The Automation System **shall** begin the Turn Segment for an RF Point that follows an IF Point at the IF Point.

(RD.3.3.1.2.1.c) The Automation System **shall** begin the Turn Segment for an RF Point that follows an RF Point at the turn completion point of the first RF Point.

(RD.3.3.1.2.1.d) The Automation System **shall** begin the Turn Segment for an RF Point that follows a TF Point at the TF Point.

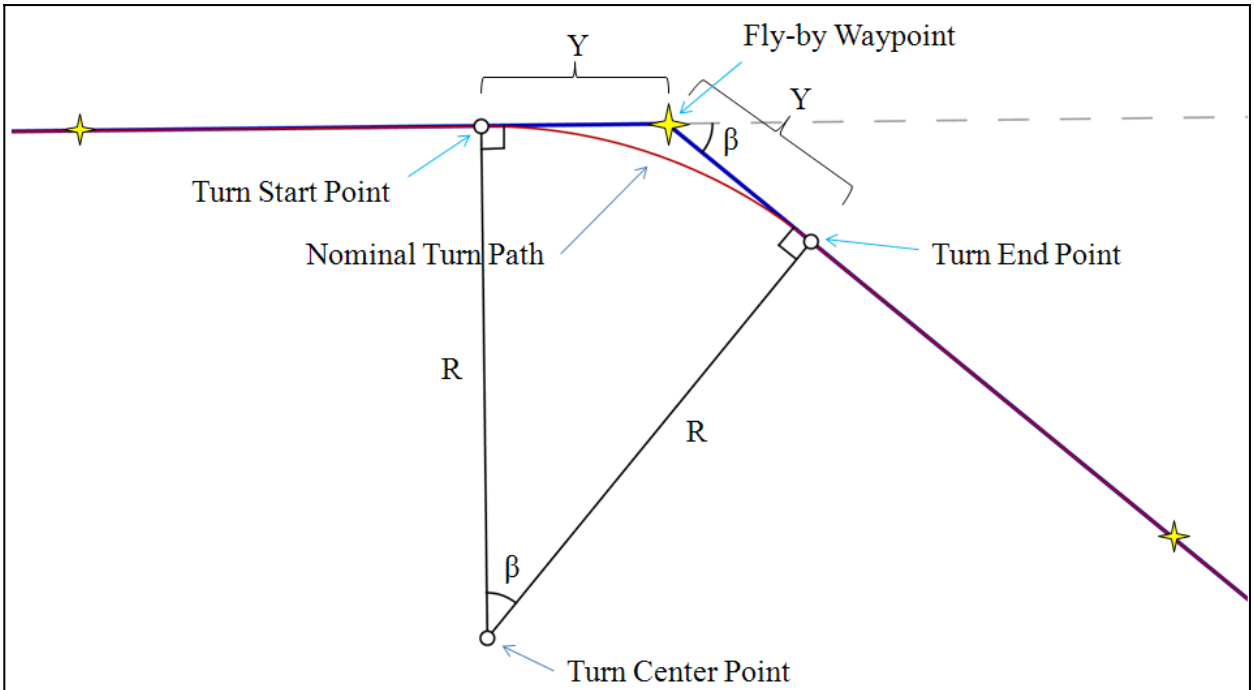
3.3.1.2.2. TF Point Turns

Figure 7 shows the details of a calculated turn for a TF point.

(RD.3.3.1.2.2.a) The Automation System **shall** use one Turn Segment in the Nominal Flight Path for each TF Point that is followed by another TF Point.

(RD.3.3.1.2.2.b) The Automation System **shall** compute the Turn Anticipation Distance for each Turn Segment in accordance with Figure 7. Note: This corresponds to Y in Figure 7.

(RD.3.3.1.2.2.c) The Automation System **shall** compute the Turn Path Distance for each Turn Segment in accordance with Figure 7. Note: This corresponds to D in Figure 7.



A = expected altitude
S = expected indicated airspeed
g = acceleration due to gravity
α = roll angle = 23°
β = course change angle

true airspeed:	$v = S(68320 + 0.293\ A)/(68320 - 0.707\ A)$
Turn Radius:	$R = v^2/(g \tan(\alpha))$
Turn Anticipation Distance:	$Y = R \tan(\beta/2)$
Turn Path Distance:	$D = \beta\ R$

Figure 7. TF Turn Segment Details

3.3.2. Aircraft Indicator Offsets

(RD.3.3.2.a) The Automation System **shall** allow either positive or negative distances of up to and including 10 NM in increments of 0.01 NM for each offset type.

(RD.3.3.2.b) RPI **shall** only display Aircraft Indicators for indicators on an Image Path where the offset projection distance calculation results in a positive or 0 value and is less than or equal to the length of the Image Path.

3.3.2.1. Static Offset

(RD.3.3.2.1.a) If a Static Offset is specified in adaptation for an Image Path, the offset distance **shall** be added to the Projection Distance when calculating the indicator location.

3.3.2.2. Wake Offset

(RD.3.3.2.2.a) When adapted for an Image Path, if an aircraft type or class is provided, the Wake Offset corresponding to that aircraft type or class **shall** be added to the Projection Distance when calculating the indicator location.

(RD.3.3.2.2.b) The Wake Offset for an aircraft type or class **shall** be zero if the input aircraft type or class is unknown or if no Wake Offset is specified for that aircraft type or class.

3.3.3. Aircraft Indicator Location

(RD.3.3.3.a) The Offset Projection Distance for an Aircraft Indicator for a given Image Path **shall** be calculated as the sum of the Projection Distance, Static Offset, and Wake Offset.

(RD.3.3.3.b) The Indicator Point location **shall** be computed by offsetting perpendicularly to the Image Path's Nominal Flight Path at the Nominal Indicator Point.

(RD.3.3.3.c) The Lateral Offset distance **shall** be applied in the same direction as the Lateral Offset of the input aircraft from the Reference Path.

(RD.3.3.3.d) If Mirror Imaging is enabled for the Image Path the Lateral Offset distance **shall** be applied in the opposite direction as the Lateral Offset of the input aircraft from the Reference Path.

3.3.4. Aircraft Indicator Display

(RD.3.3.4.a) The Automation System **shall** allow changes in the datablock offset for any Aircraft Indicator displayed on a per display basis.

(RD.3.3.4.b) The Automation System **shall** allow changing the datablock offset for all current and future Aircraft Indicators for an individual Application or an Application Set on a per display basis.

(RD.3.3.4.c) The Automation System **shall** allow changing the datablock offset for all current and future Aircraft Indicators for all Applications or Application Sets on a per display basis.

(RD.3.3.4.d) The Automation System **shall** allow the controller to toggle the datablock state of any Aircraft Indicator between RPI full datablocks and RPI partial datablocks on a per display basis.

(RD.3.3.4.e) The Automation System **shall** allow the controller to toggle the datablock state of all current and future Aircraft Indicators on an Application or Application Set basis between RPI full datablocks and RPI partial datablocks on a per display basis.

(RD.3.3.4.f) The Automation System **shall** allow the controller to toggle the datablock state of all current and future Aircraft Indicators between RPI full datablocks and RPI partial datablocks on a per display basis.

(RD.3.3.4.g) RPI Applications and Application Sets **shall** be enabled and disabled by keyboard entry and graphical interface at the display on a per display basis.

(RD.3.3.4.h) RPI Application keyboard entries **shall** only be allowed for Applications and Application Sets adapted for the area for the individual display.

(RD.3.3.4.i) The graphical interface **shall** only display Applications and Application Sets adapted for the area for the individual display.

(RD.3.3.4.j) Consolidation **shall** retain the current RPI configuration for the receiving display.

3.3.4.1. Aircraft Indicator Display Suppression

(RD.3.3.4.1.a) The Automation System **shall** allow the controller to enable and inhibit the display of all Aircraft Indicators on a display.

(RD.3.3.4.1.b) The Automation System **shall** indicate if the display of all the Aircraft Indicators is inhibited.

(RD.3.3.4.1.c) The Automation System **shall** allow the controller to enable and inhibit the display of all Aircraft Indicators for any specific RPI Application Set on a display.

(RD.3.3.4.1.d) The Automation System **shall** allow the controller to enable and inhibit the display of all Aircraft Indicators for any specific RPI Application on a display.

(RD.3.3.4.1.e) The Automation System **shall** allow the controller to enable and inhibit the display of all Aircraft Indicators for any specific Input Aircraft on a display.

(RD.3.3.4.1.f) The Automation System **shall** allow the controller to enable and inhibit the display of any specific individual Aircraft Indicator.

(RD.3.3.4.1.g) The Automation System **shall** allow the controller to display track information for the Input Aircraft associated with the Aircraft Indicator.

3.4. Computer Human Interface (CHI)

(RD.3.4.a) All RPI-related keystrokes and menu interactions **shall** be implemented in accordance with Appendix 4 of this document.

3.5. Data Recording

(RD.3.5.a) The Automation System **shall** record all RPI data necessary for playback and analysis.

3.6. Simulation

(RD.3.6.a) The Automation System **shall** provide a capability to simulate RPI Applications to support personnel training, testing, and data playback.

Appendix 1 Definitions

Term	Definition
Aircraft Indicators	Controller scope targets that represent the position of an Input Aircraft as projected from one path onto another.
Application	A single operating instance of the RPI system consisting of a unique reference path, one or more Image Paths, one or more qualification regions, and a set of filters. The behavior of an RPI Application is specified by its RPI Adaptation as well as by specific commands input by the controller.
Application Set	A set of RPI Applications assembled and tailored in adaptation for use in a particular sector of a facility.
Image Path	A path composed of an ordered series of points corresponding to the termination fixes of a route. Aircraft Indicators are projected onto Image Paths based on the position of input aircraft on a Reference Path.
Image Point	The termination fix of the leg that terminates an Image Path.
Indicator Point	The final projected location of an Aircraft Indicator projected onto a specific Image Path.
Initial Fix	The first fix in a path.
Input Aircraft	An aircraft on the Reference Path that is projected onto the Image Path.
Lateral Offset Distance	The distance of an input aircraft to the left or the right of the Nominal Flight Path.
Merge Point	The Image Path and the Reference Path intersect at the Merge Point.
Mirror Imaging	A setting for an Image Path that causes Aircraft Indicators on that path to be projected to the right of that path if they would normally be to the left of that path, and vice-versa.
Nominal Flight Path	A path representing the possible flight of an aircraft computed solely from the Path and characteristics of that Path. The Nominal Flight Path is not dependent on the performance of

Term	Definition
	actual Input Aircraft.
Nominal Indicator Point	The point on the Nominal Flight Path of an Image Path whose distance to the Image Point is the Projection Distance of that Input Aircraft.
Offset Projection Distance	The Projection Distance of an input aircraft after having had applicable offsets applied to it.
Path Segment	A single segment of a Nominal Flight Path.
Projection Distance	The distance from the Qualifying Point to the Reference Point along the Nominal Flight Path of a Reference Path of an input aircraft.
Qualification Region	A simple polygonal region of space. Input aircraft must be contained within a Qualification Region to qualify for projection by RPI.
Qualifying Point	The point on the Nominal Flight Path that is closest to the Input Aircraft; also the starting point for the Projection Distance computation.
Qualifying Segment	The Path Segment that has the shortest Lateral Offset Distance to the Input Aircraft, i.e. the Path Segment that contains the Qualifying Point.
Reference Path	A path composed of points corresponding to the termination fixes of a route. Aircraft indicators are projected onto Image Paths based on the position of input aircraft on a Reference Path.
Reference Point	The termination fix of the leg that terminates a Reference Path.
RF Point	A point that terminates an RF segment. RF Points are used in the definition of Reference Paths and Image Paths.
RPI Adaptation	A configuration file for the RPI Applications. An RPI Adaptation also defines additional parameters that control and filter the displayed Aircraft Indicators.
Static Offset	A constant-value offset applied to the Projection Distance.
Straight Segment (Path Segment)	A segment of a Nominal Flight Path that is straight.
TF Point	A point that terminates a TF segment. A TF Point has with it a nominal speed and altitude. TF

Term	Definition
	Points are used in the definition of Reference Paths and Image Paths.
Turn Anticipation Distance	The distance on the Straight Segment from the Turn Start Point to the TF Point or equivalently from the Turn End Point to the TF Point.
Turn Center Point	The center point of the arc of a circle that composes a turn.
Turn End Point	The point on the Straight Segment where the Turn Segment Ends; also the closest point on the outgoing Straight Segment to the Turn Center Point.
Turn Path Distance	The length of the Turn Segment.
Turn Radius	The shortest distance from the Turn Center Point to the Straight Segment.
Turn Segment (Path Segment)	A segment of a Nominal Flight Path that turns.
Turn Start Point	The point on the Straight Segment where the Turn Segment begins; also the closest point on the incoming Straight Segment to the Turn Center Point.
Wake Offset	An offset applied to the Projection Distance of an input aircraft intended to be used for the variable wake distances of input aircraft when using RPI to tie indicators to other input aircraft for spacing.
WGS84 geodetic points	WGS-84 is the most accurate and widely used globally-applicable ellipsoidal model of the earth. WGS-84 is used to calculate geodesic distances between a pair of latitude/longitude points on the earth’s surface.

Appendix 2 Acronyms and Abbreviations

Acronym	Definition
CHI	Computer-Human Interface
ft	feet
IAS	Indicated Airspeed
IF	Initial Fix
kts	Knots
MSL	Mean Sea Level
NAVAIDS	Navigation Aids
NM	Nautical Miles
RF	Radius-to-Fix
RNP	Required Navigation Performance
RNAV	Area Navigation
RPI	Relative Position Indicator
STARS	Standard Terminal Automation Replacement System
RF	Radius-to-Fix
TF	Track-to-Fix
TRACON	Terminal Radar Approach Control
WGS84	World Geodetic System
XML	Extensible Markup Language

Appendix 3 Adaptable Parameters

RD Requirement ID	Parameter	Values
RD.3.1.1.b	Reference Path sequence points	WGS84 geodetic points beginning with an Initial Fix (IF) and terminating at a Reference Point, and each point following the IF shall be the termination fix of a leg either of type TF or of type RF
RD.3.1.1.d	Reference Path sequence points	altitude in ft MSL
RD.3.1.1.d	Reference Path sequence points	airspeed in kts IAS
RD.3.1.2.b	Image Path Sequence points	WGS84 geodetic points beginning with an Initial Fix (IF) and terminating at an Image point, and each point following the IF shall be the termination of a leg either of type TF or of type RF
RD.3.1.2.d	Image Path Sequence points	altitude in ft MSL
RD.3.1.2.d	Image Path Sequence points	airspeed in kts IAS
RD.3.1.2.f	Image Path Mirror Imaging	enabled/disabled
RD.3.1.3.d	Qualification Region	WGS84 geodetic points that define a simple non-self-intersecting polygon
RD.3.1.3.1.1.a	Qualification Region Magnetic Heading Filter	beginning/ending range in degrees
RD.3.1.3.1.2.b	Qualification Region Altitude Filter	floor and ceiling altitude in feet above mean sea level
RD.3.1.3.1.2.d	Qualification Region Mode C Filter	Reported Mode C or absence thereof
RD.3.1.3.1.3.b	Qualification Region Scratchpad Inclusion Filter	number of scratchpads
RD.3.1.3.1.3.d	Qualification Region Scratchpad Inclusion Filter	scratchpad value or blank
RD.3.1.3.1.3.f	Qualification Region	number of scratchpads

	Scratchpad Exclusion Filter	
RD.3.1.3.1.3.h	Qualification Region Scratchpad Exclusion Filter	scratchpad value or blank
RD.3.1.3.1.4.b	Qualification Region Datablock Offset Filter	datablock offset direction (N, NE, E, SE, S, SW, W, NW)
RD.3.1.3.1.5.b	Qualification Region Entry Fix Inclusion Filter	number of entry fixes
RD.3.1.3.1.5.1.d	Qualification Region Entry Fix Inclusion Filter	entry fix or blank
RD.3.1.3.1.5.1.f	Qualification Region Entry Fix Exclusion Filter	number of entry fixes
RD.3.1.3.1.5.1.h	Qualification Region Entry Fix Exclusion Filter	entry fix or blank
RD.3.1.3.1.6.b	Qualification Region Exit Fix Inclusion Filter	number of exit fixes
RD.3.1.3.1.6.h	Qualification Region Exit Fix Inclusion Filter	exit fix or blank
RD.3.1.3.1.6.f	Qualification Region Exit Fix Exclusion Filter	number of exit fixes
RD.3.1.3.1.6.h	Qualification Region Exit Fix Exclusion Filter	exit fix or blank
RD.3.1.3.1.7.b RD.3.1.3.1.7.e	Qualification Region Controller Symbol Filter	any valid controller symbol available to the automation system
RD.3.2.1.a	Datablock Type	full or partial
RD.3.2.1.f	Datablock Color	available colors
RD.3.2.1.c	Datablock Field Timesharing	all fields available in the Input Aircraft datablock
RD.3.2.1.c	Datablock Field Display	all fields available in the Input Aircraft datablock
RD.3.2.1.f	Aircraft Indicator Color	available colors
RD.3.2.1.g	Aircraft Indicator Symbol	any character or symbol available in the display font or

		no symbol
RD.3.2.2.a	Leading Indicator Extension Line	enabled/disabled
RD.3.2.2.c	Trailing Indicator Extension Line	enabled/disabled
RD.3.2.2.a	Leading Indicator Extension Line	distance in 0.01 NM increments 0 to 10 NM
RD.3.2.2.c	Trailing Indicator Extension Line	distance in 0.01 NM increments 0 to 10 NM
RD.3.3.2.1.a	Static Offset	offset distance in 0.01 NM increments -10 to 10 NM
RD.3.3.2.2.a	Wake Offset	based on a/c type or class, offset distance in 0.01 NM increments 0 to 10 NM
RD.3.2.3.a	History Trails	enabled/disabled
RD.3.1.c	Application Set	any number of valid RPI Applications in system adaptation
RD.3.1.s	RPI Enable/Disable	enable/disable RPI Applications or Application Sets facility wide

Appendix 4 Computer Human Interface Keystrokes and Menu Interactions

RD Req ID	RD Shall Statements	GUI	Proposed Syntax
RD.3.3.4.1.a	The Automation System **shall** allow the controller to enable and inhibit the display of all Aircraft Indicators on a display.	1) Show the Aircraft Indicators for all and future aircrafts on the display 2) Hide the Aircraft Indicators for all and future aircrafts on the display	<F8> <R> <ENTER>
RD.3.3.4.1.c	The Automation System **shall** allow the controller to enable and inhibit the display of all Aircraft Indicators for any specific RPI Application Set on a display.	1) Show the Aircraft Indicators for all and future aircrafts for the selected Application Set on the display 2) Hide Aircraft Indicators for all and future aircrafts for the selected Application Set on the display	<F8> <R> <Sector ID Optional> <Application Set Name> <ENTER>
RD.3.3.4.1.d	The Automation System **shall** allow the controller to enable and inhibit the display of all Aircraft Indicators for any specific RPI Application on a display.	1) Show all Aircraft Indicators for the specified RPI Application on the display 2) Hide all Aircraft Indicators for the specified RPI Application on the display	<F8> <R> <Sector ID Optional> <Application Name> <ENTER>
RD.3.3.4.1.e	The Automation System **shall** allow the controller to enable and inhibit the display of all Aircraft Indicators	1) Show all Aircraft Indicators for the specific Input Aircraft on the display 2) Hide all Aircraft	<F8> <R> <SLEW> Input aircraft <ENTER>

	for any specific Input Aircraft on a display.	Indicators for the specific Input Aircraft on the display	
RD.3.3.4.1.f	The Automation System **shall** allow the controller to enable and inhibit the display of any specific individual Aircraft Indicator.	1) Show the specific individual Aircraft indicator 2)Hide the specific individual Aircraft indicator	<F8> <R> <SLEW> Aircraft Indicator<ENTER>
RD.3.3.4.a	The Automation System **shall** allow changes in the datablock offset for any Aircraft Indicator displayed on a per display basis.	The leader direction of the Aircraft Indicator datablock changes to the selected position (or back to default)	<leader direction (1/2/3/4/5/6/7/8/9) <SLEW><ENTER>
RD.3.3.4.b RD.3.3.4.c	The Automation System **shall** allow changing the datablock offset for all current and future Aircraft Indicators for an individual Application or an Application Set on a per display basis.	The leader direction of the Aircraft Indicator datablock for Application or Application Set changes to the selected position (or back to default)	<F8> <R> <L> (optional name or Application Set) leader direction (1/2/3/4/5/6/7/8/9) <ENTER>
RD.3.3.4.d	The Automation System **shall** allow the controller to toggle the datablock state of any Aircraft Indicator between RPI full datablocks and RPI partial datablocks on a per display basis.	1) Show the full datablock (and hide the partial) for the Aircraft indicator 2) Show the partial datablock (and hide the full) for the Aircraft indicator	Slew to indicator datablock <SED>
RD.3.3.4.e	The Automation System **shall** allow the controller to toggle the datablock state of	1) Show the full datablocks (and hide the partial) for all current and future Aircraft	<F8> <R> <G> <Sector ID Optional> <Application name Application

	all current and future Aircraft Indicators on an Application or Application Set basis between RPI full datablocks and RPI partial datablocks on a per display basis.	Indicators on the selected Application or Application Set 2) Show the partial datablocks (and hide the full) for all current and future Aircraft Indicators on the selected Application or Application Set	Set Name> <ENTER>
RD.3.3.4.f	The Automation System **shall** allow the controller to toggle the datablock state of all current and future Aircraft Indicators between RPI full datablocks and RPI partial datablocks on a per display basis.	1) Show the full datablock (and hide the partial) for all current and future Aircraft Indicators 2) Show the partial datablock (and hide the full) for all current and future Aircraft Indicators	<F8> <R> <G> <ENTER>
RD.3.1.3.1.b	The Automation System **shall** allow an enable or disable override of all filters for a specific Input Aircraft.	1) Show the indicators of the specific Input Aircraft in any Qualification region or in any filters 2) Hide the indicators of the specific Input Aircraft in any Qualification region or in any filters	<F8> <R> <*> Slew to input aircraft <SED>
RD.3.1.2.i	The Automation System **shall** provide the capability to toggle the display of all RPI Reference Paths and Image Paths on and off.	1) Show the RPI Reference Paths and Image Paths for the display 2) Hide the RPI Reference Paths and Image Paths for the display	<F8> <R> <I> <enter>
RD.3.1.3.h	The Automation System **shall**	1) Show the RPI Qualification	<F8> <R> <Q> <ENTER>

	provide the capability to toggle display of all RPI Qualification regions adapted for the display.	regions adapted for the display 2) Hide the RPI Qualification regions adapted for the display	
RD.3.1.3.i	The Automation System **shall** provide the capability to toggle display of RPI Qualification regions on and off on a per Application or Application Set basis adapted for the display.	1) Show the RPI Qualification regions per Application or Application set 2) Hide the RPI Qualification regions per Application or Application set	<F8> <R> <Q> <Section ID Optional> <Application name Application Set Name> <ENTER>
RD.3.1.2.j	The Automation System **shall** provide the capability to toggle the display of RPI Image Paths on and off on a per Application or Application Set basis.	1) Show the RPI Image paths per Applications or Application Set 2) Hide the RPI Image paths per Applications or Application Set	<F8> <R> <I> Sector ID Optional <Application name Application Set Name> <ENTER>
RD.3.1.1.f	The Automation System **shall** provide the capability to toggle the display of RPI Reference Paths on and off on a per Application or Application Set basis.	1) Show the RPI Reference paths per Applications or Application Set 2) Hide the RPI Reference paths per Applications or Application Set	<F8> <R> <R> Sector ID Optional <Application name Application Set Name> <ENTER>
RD.3.1.q	The Automation System **shall** have the capability to enable and disable the RPI function facility-wide.	Menu…	<F8> < R> <+/-> <ENTER>
RD.3.3.4.1.b	The Automation System **shall** indicate if the	Menu…	-

	display of all the Aircraft Indicators is inhibited.		
RD.3.1.t	The Automation System **shall** provide facility-wide RPI status in the system status data area.	Menu…	-
RD.3.1.u	The Automation System **shall** provide the capability to display the status of individual RPI Applications and Application Sets.	Menu…	-
RD.3.3.4.g	RPI Applications and Application Sets **shall** be enabled and disabled by keyboard entry and graphical interface at the display on a per display basis.	Menu…	<F8> <R> Sector ID Optional <Application name Application Set Name> <E/I> <ENTER>
RD.3.1.p	RPI Applications and Application Sets **shall** be enabled and disabled by keyboard entry and graphical interface facility-wide.	Menu…	<F8> < R> Sector ID Optional <Application name Application Set Name> <+/-> <ENTER>